

SLOVENSKI STANDARD

SIST EN 62311:2008

01-julij-2008

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SIST EN 50392:2004

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Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

Bewertung von elektrischen und elektronischen Einrichtungen in Bezug auf Begrenzungen der Exposition von Personen in elektromagnetischen Feldern (0 Hz - 300 GHz)

Evaluation des équipements électroniques et électriques en relation avec les restrictions d'exposition humaine aux champs électromagnétiques (0 Hz - 300 GHz)

Ta slovenski standard je istoveten z: **EN 62311:2008**

ICS:

13.280 Varstvo pred sevanjem Radiation protection

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EUROPEAN STANDARD

EN 62311

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2008

ICS 97.030

Supersedes EN 50392:2004

English version

**Assessment of electronic and electrical equipment
related to human exposure restrictions
for electromagnetic fields (0 Hz - 300 GHz)
(IEC 62311:2007, modified)**

Evaluation des équipements
électroniques et électriques
en relation avec les restrictions
d'exposition humaine
aux champs électromagnétiques
(0 Hz - 300 GHz)
(CEI 62311:2007, modifiée)

Bewertung von elektrischen
und elektronischen Einrichtungen
in Bezug auf Begrenzungen
der Exposition von Personen
in elektromagnetischen Feldern
(0 Hz - 300 GHz)
(IEC 62311:2007, modifiziert)

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This European Standard was approved by CENELEC on 2007-12-04. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 106/129/FDIS, future edition 1 of IEC 62311, prepared by IEC TC 106, Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, was submitted to the IEC-CENELEC parallel vote.

A draft amendment, prepared by the Technical Committee CENELEC TC 106X, Electromagnetic fields in the human environment, was submitted to the Unique Acceptance Procedure.

The combined texts of IEC 62311:2007 and the draft amendment prAA were approved by CENELEC as EN 62311 on 2007-12-04.

This European Standard supersedes EN 50392:2004.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2009-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-01-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 62311:2007 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

2 Normative references

Add:

Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), Official Journal L 199 of 30 July 1999

3 Definitions

3.4 Replace "current density" by "induced current density".

Replace the whole Clause 4 by:

4 Compliance criteria

The electronic and electrotechnical apparatus shall comply with the basic restriction as specified in Annex II of Council Recommendation 1999/519/EC.

NOTE 1 The time averaging in the EU-Recommendation applies.

The reference levels in the Council Recommendation 1999/519/EC on public exposure to electromagnetic fields are derived from the basic restrictions using worst-case assumptions about exposure. If the reference levels are met, then the basic restrictions will be complied with, but if the reference levels are exceeded, that does not necessarily mean that the basic restrictions will not be met. In some situations, it will be necessary to show compliance with the basic restrictions directly, but it may also be possible to derive compliance criteria that allow a simple measurement or calculation to demonstrate compliance with the basic restriction. Often these compliance criteria can be derived using realistic assumptions about conditions under which exposures from a device may occur, rather than the conservative assumptions that underly the reference levels.

NOTE 2 The limit is the basic restriction.

If the technology in the apparatus is not capable of producing an E-field, H-field or contact current, at the normal user position, at levels higher than 1/2 the limit values then the apparatus is deemed to comply with the requirements in this standard in respect of that E-field, H-field or contact current without further assessment.

Bibliography

Add the following note for the standard indicated:

ISO/IEC 17025 NOTE Harmonized as EN ISO/IEC 17025:2005 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-161	-1)	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	-	-

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1) Undated reference.



IEC 62311

Edition 1.0 2007-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Assessment of electronic and electrical equipment related to human exposure
restrictions for electromagnetic fields (0 Hz – 300 GHz)**

**Evaluation des équipements électroniques et électriques en relation avec
les restrictions d'exposition humaine aux champs électromagnétiques
(0 Hz – 300 GHz)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

XB

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ASSESSMENT OF ELECTRONIC AND ELECTRICAL EQUIPMENT
RELATED TO HUMAN EXPOSURE RESTRICTIONS
FOR ELECTROMAGNETIC FIELDS (0 Hz – 300 GHz)**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62311 has been prepared by IEC technical committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure.

The text of this standard is based on the following documents:

FDIS	Report on voting
106/129/FDIS	106/134/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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ASSESSMENT OF ELECTRONIC AND ELECTRICAL EQUIPMENT RELATED TO HUMAN EXPOSURE RESTRICTIONS FOR ELECTROMAGNETIC FIELDS (0 Hz – 300 GHz)

1 Scope and object

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current.

NOTE This standard is intended to cover both intentional and non-intentional radiators. If the equipment complies with the requirements in another relevant standard, e.g. EN 50371 covering low power equipment, then the requirements of this standard (IEC 62311) are considered to be met and the application of this standard to that equipment is not necessary. See also Clause 7.2.

2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-161, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

3 Terms and definitions

For the purposes of this document, the terms and definitions contained in IEC 60050-161 as well as the following terms and definitions apply.

3.1 averaging time

t_{avg}
appropriate time over which exposure is averaged for purposes of determining compliance

3.2 basic restriction

maximum exposure level that should not be exceeded under any conditions

NOTE Examples of basic restrictions can be found in Annex II of the Council Recommendation 1999/519/EC [6]¹⁾, ICNIRP Guidelines [1] IEEE Std C95.6™ [2] and IEEE Std C95.1™ [3].

1) Figures in square brackets refer to the Bibliography.

3.3**contact current**

current flowing into the body resulting from contact with a conductive object in an electromagnetic field. This is the localised current flow into the body (usually the hand, for a light brushing contact)

3.4**current density***J*

current per unit cross-sectional area flowing inside the human body as a result of exposure to electromagnetic fields

3.5**duty factor**

duty cycle

ratio of pulse duration to the pulse period of a periodic pulse train. Also, a measure of the temporal transmission characteristic of an intermittently transmitting RF source such as a paging antenna by dividing average transmission duration by the average period for transmissions. A duty factor of 1,0 corresponds to continuous operation

3.6**electric field strength***E*

magnitude of a field vector at a point that represents the force (*F*) on an infinitely small charge (*q*) divided by the charge

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$$E = \frac{F}{q}$$

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3.7**equipment under test****EUT**

an electrical or electronic apparatus that is tested for compliance with exposure limits

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3.8**exposure**

exposure occurs whenever and wherever a person is subjected to electric, magnetic or electromagnetic fields or to contact current other than those originating from physiological processes in the body and other natural phenomena

3.9**exposure level**

value of the quantity used to assess exposure

NOTE This may be an induced current density, *SAR*, power density, electric or magnetic field strength, a limb current or a contact current.

3.10**exposure limit**

value of an electric, magnetic or electromagnetic field derived from the basic restrictions using worst-case assumption about exposure. If the exposure limit is not exceeded, then the basic restrictions will never be exceeded

3.11**exposure, direct effect of**

result of a direct interaction in the exposed human body from exposure to electromagnetic fields

3.12

exposure, indirect effect of

result of a secondary interaction between the exposed human body and an electromagnetic field, often used to describe a contact current, shock or burn arising from contact with a conductive object

3.13

exposure, partial-body

localised exposure of part of the body, producing a corresponding localised *SAR* or induced current density, as distinct from a whole-body exposure

3.14

exposure, whole-body

exposure of the whole body (or the torso when induced current density is considered)

3.15

induced current

current induced inside the body as a result of exposure to electromagnetic fields

3.16

limb current

current flowing in an arm or a leg, either as a result of a contact current or else induced by an external field

3.17

magnetic field strength

H

magnitude of a field vector in a point that results in a force (*F*) on a charge (*q*) moving with velocity (*v*)

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 $F = q(v \times \mu H)$

(or magnetic flux density divided by permeability of the medium, see 3.18 “magnetic flux density”)

3.18

magnetic flux density

B

magnitude of a field vector that is equal to the magnetic field *H* multiplied by the permeability (*μ*) of the medium

$$B = \mu H$$

3.19

multiple frequency fields

superposition of two or more electromagnetic fields of differing frequency.

NOTE These may be from different sources within a device, e.g., the magnetron and the transformer of a microwave oven, or they may be harmonics in the field of a nominally single frequency source such as a transformer

3.20

power density

S

power per unit area normal to the direction of electromagnetic wave propagation. For plane waves the power density (*S*), electric field strength (*E*) and magnetic field strength (*H*) are related by the impedance of free space, i.e., 377 Ω

$$S = \frac{E^2}{377} = 377 H^2 = EH$$

NOTE 1 Although many survey instruments indicate power density units, the actual quantities measured are E or H or the square of those quantities.

E and H are expressed in units of V/m and A/m, respectively, and S in the unit of W/m².

NOTE 2 It should be noted that the value of 377 Ω is only valid for free space, far field measurement conditions.

3.21

power density, average (temporal)

instantaneous power density integrated over a source repetition period. This averaging is not to be confused with the measurement averaging time

3.22

power density, plane-wave equivalent

commonly used term associated with any electromagnetic wave, equal in magnitude to the power density of a plane wave having the same electric (E) or magnetic (H) field strength as the measured field

3.23

reference levels

levels of field strength or power density derived from the basic restrictions using worst-case assumptions about exposure. If the reference levels are met, then the basic restrictions will be complied with, but if the reference levels are exceeded, that does not necessarily mean that the basic restrictions will not be met

3.24

root-mean-square

r.m.s.

the effective value or the value associated with joule heating, of a periodic electromagnetic wave. The r.m.s. value is obtained by taking the square root of the mean of the squared value of a function

$$F = \sqrt{\frac{1}{T} \int_{-\frac{T}{2}}^{\frac{T}{2}} (F(t) \cdot F(t)^* dt)} \quad (\text{expression in time domain})$$

$$X = \sqrt{\sum_{1}^n (X_n)^2} \quad (\text{expression in frequency domain})$$

NOTE Although many survey instruments in the high frequency range indicate r.m.s., the actual quantity measured is root-sum-square (rss) (equivalent field strength).

3.25

root-sum-square

rss

the value rss is obtained from three individual r.m.s. field strength values, measured in three orthogonal directions, combined disregarding the phases.

$$X = \sqrt{X_x^2 + X_y^2 + X_z^2}$$